



## **Dynamics of CO<sub>2</sub>-exchange and C-budgets due to soil erosion: Insights from a 4 years observation period**

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Agriculture in the hummocky ground moraine landscape of NE-Germany is characterized by an increase in energy crop cultivation, like maize or sorghum. Both enhance lateral C fluxes by erosion and induce feedbacks on C dynamics of agroecosystems as a result of reduced wintertime plant cover and vigorous crop growth during summer. However, the actual impact of these phenomena on the CO<sub>2</sub>-sink/-source function of agricultural landscapes, is still not clear.

Therefore, the interdisciplinary project “CarboZALF” was established in Dedelow/Prenzlau (NE-Germany) in 2009. Within the field experiment CarboZALF-D, CO<sub>2</sub> fluxes for the soil-plant systems were monitored, covering typical landscape relevant soil states in respect to erosion and deposition, like Calcic Cutanic Luvisol and Endogleyic Colluvic Regosol.

Automated chamber systems, each consisting of four transparent chambers (2.5 m height, basal area 2.25 m<sup>2</sup>), were placed along gradients at both measurement sites. Monitored CO<sub>2</sub> fluxes were gap-filled on a high-temporal resolution by modelling ecosystem respiration (Reco), gross primary productivity (GPP) and net ecosystem exchange (NEE) based on parallel and continuous measurements of the CO<sub>2</sub> exchange, soil and air temperatures as well as photosynthetic active radiation (PAR). Gap-filling was e.g. needed in case of chamber malfunctions and abrupt disturbances by farming practice. The monitored crop rotation was corn-winter wheat (2 a), sorghum-winter triticale and alfalfa (1.5 a).

In our presentation we would like to show insights from a 4 years observation period, with pronounced differences between the eroded and the colluvial soil: The Endogleyic Colluvic Regosol showed higher flux rates for Reco, GPP and NEE compared to the Calcic Cutanic Luvisol. Site-specific NEE and C-balances were positively related to soil C-stocks as well as biomass production, and generated a minor C-sink in case of the Calcic Cutanic Luvisol and a highly variable C-source in case of the Endogleyic Colluvic Regosol. Moreover, obtained high local variability in CO<sub>2</sub> fluxes and C-balances at both sites, can be interpreted in terms of relevant drivers.